

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A method for densifying fibers comprising:
providing fibers that have hydrogen bonding functional sites, said fibers densifying to a first density when compressed under a first set of conditions; and
applying densifying agent to the fibers in an amount effective to provide fibers having the densifying agent applied thereto that densify to a second density when compressed under the first set of conditions, the second density being greater than the first density.
2. The method of Claim 1, wherein the densifying agent has a volatility less than water.
3. The method of Claim 1, wherein the densifying agent is selected from the group consisting of (a) polymeric materials with repeating units, wherein each repeating unit has a functional group capable of forming a hydrogen bond with a fiber, and (b) non-polymeric organic materials with a functional group capable of forming a hydrogen bond with a fiber.
4. The method of Claim 3, wherein the densifying agent is a polymeric material selected from the group consisting of polyglycol, a polycarboxylic acid, a polycarboxylate, a poly(lactone) polyol, a polyamide, a polyamine, a polysulfonic acid, a polysulfonate, and combinations thereof.
5. The method of Claim 3, wherein the densifying agent is a non-polymeric organic material that includes a functionality selected from the group consisting of a carboxyl, a carboxylate, a carbonyl, a sulfonic acid, a sulfonate, a sulfonamide, a hydroxyl, a phosphoric acid, a phosphate, a phosphoramidate, an amide, an amine, and combinations thereof.
6. The method of Claim 5, wherein the densifying agent is selected from the group consisting of glycerin, sorbitol, propylene glycol, and combinations thereof.
7. The method of Claim 3, wherein the densifying agent is applied in an amount ranging from 0.1% to 30.0% by weight based on the weight of dry fibers and densifying agent.

8. The method of Claim 1, further comprising densifying the fibers having the densifying agent applied thereto by applying external pressure on the fibers.

9. The method of Claim 8, further comprising the step of forming the fibers into a web, sheet, or bale before densification such that the web, sheet, or bale is densified by applying external pressure on the web, sheet, or bale.

10. The method of Claim 9, wherein the densifying step comprises applying external pressure on the web or sheet by passing the web or sheet through a nip of a calendar roll.

11. The method of Claim 9, wherein the densifying step comprises applying external pressure on the web or sheet in a press.

12. The method of Claim 9, wherein the densifying step comprises applying external pressure on the bale in bale form.

13. The method of Claim 1, wherein the fibers are wood pulp fibers.

14. The method of Claim 1, wherein the fibers include intrafiber crosslinks.

15. The method of Claim 1, wherein the densifying agent is selected from the group of inorganic materials that add mass to the fibers without an appreciable increase in volume of the fibers.

16. The method of Claim 15, wherein the densifying agent is selected from the group of inorganic materials that have the characteristic of promoting the disruption of intra-fiber hydrogen bonds.

17. The method of Claim 15, wherein inorganic densifying agent is selected from the group consisting of tetrapotassium pyrophosphate, tetrasodium pyrophosphate, sodium salt of ethylenediaminetetraacetic acid, and dibasic sodium phosphate.

18. The method of Claim 15, wherein the inorganic densifying agent is applied in an amount ranging from 1.0% to 50.0 % by weight based on the weight of dry fiber and densifying agent.

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19. The method of Claim 1, further comprising the step of adding particles to the fibers.
20. The method of Claim 19, wherein the particles are superabsorbent.
21. A densified mass of fibers comprising:
fibers having hydrogen bonding functional sites, said fibers densifying to a first density when compressed under a first set of conditions;
densifying agent in an amount effective to provide fibers having the densifying agent applied thereto that densify to a second density when compressed under the first set of conditions, the second density being greater than the first density.
22. The densified mass of fibers of Claim 21, wherein the densifying agent is selected from the group consisting of (a) polymeric materials with repeating units, wherein each repeating unit has a functional group capable of forming a hydrogen bond with a fiber, and (b) non-polymeric organic materials with a functional group capable of forming a hydrogen bond with a fiber.
23. The densified mass of fibers of Claim 22, wherein the densifying agent is a polymeric material selected from the group consisting of polyglycol, a polycarboxylic acid, a polycarboxylate, a poly(lactone) polyol, a polyamide, a polyamine, a polysulfonic acid, a polysulfonate, and combinations thereof.
24. The densified mass of fibers of Claim 22, wherein the densifying agent is a non-polymeric organic material that includes a functionality selected from the group consisting of a carboxyl, a carboxylate, a carbonyl, a sulfonic acid, a sulfonate, a sulfonamide, a hydroxyl, a phosphoric acid, a phosphate, a phosphoramidate, an amide, an amine, and combinations thereof.
25. The densified mass of fibers of Claim 24, wherein the densifying agent is selected from the group consisting of glycerin, sorbitol, propylene glycol, and combinations thereof.
26. The densified mass of fibers of Claim 22, wherein the densifying agent is applied in an amount ranging from 0.1% to 30.0% by weight based on the weight of the dry fibers and densifying agent.

27. The densified mass of fibers of Claim 21, wherein the fibers are wood pulp fibers.
28. The densified mass of fibers of Claim 21, wherein the fibers include intrafiber crosslinks.
29. The densified mass of fibers of Claim 21, further comprising particles.
30. The densified mass of fibers of Claim 29, wherein the particles are superabsorbent.
31. The densified mass of fibers of Claim 21, wherein the densifying agent is selected from the group consisting of inorganic materials that add mass to the fibers without an appreciable increase in volume of the fibers.
32. The densified mass of fibers of Claim 31, wherein the densifying agent is selected from the group of inorganic materials that have the characteristic of promoting the disruption of intra-fiber hydrogen bonds.
33. The densified mass of fibers of Claim 31, wherein the densifying agent is selected from the group consisting of tetrapotassium pyrophosphate, tetrasodium pyrophosphate, sodium salt of ethylenediaminetetraacetic acid, and dibasic sodium phosphate.
34. The densified mass of fibers of Claim 31, wherein the densifying agent is applied in an amount ranging from 1.0% to 50.0 % by weight based on the weight of dry fiber and densifying agent.
35. A mass of fibers made by the method of Claims 1, 3, 6, 13, 14, 15, 16, 17, or 20.
36. An article comprising the fibers of Claims 21, 22, 25, 27, 28, 30, 31, 32, or 33.
37. The article of Claim 36 selected from the group consisting of diapers, incontinent devices, bed pads, wipes, feminine hygiene products, and bandages.
38. The article of Claim 36, wherein the article is absorbent.
39. A method for softening fibers comprising:

providing fibers that have hydrogen bonding functional sites; and
applying a softening agent selected from the group consisting of
glycerin, sorbitol, tetrapotassium pyrophosphate, lactic acid, and mixtures thereof.

40. The method of Claim 39, wherein the softening agent is applied in an amount ranging from 0.1% to 30.0% by weight based on the weight of dry fibers and softening agent.

41. The method of Claim 39, wherein the fibers are wood pulp fibers.

42. The method of Claim 39, wherein the fibers include intrafiber crosslinks.

43. The method of Claim 39, further comprising the step of adding particles to the fibers.

44. The method of Claim 39, wherein the particles are superabsorbent.

45. A softened mass of fibers comprising:
fibers having hydrogen bonding functional sites; and
softening agent selected from the group consisting of glycerin, sorbitol, tetrapotassium pyrophosphate, lactic acid, and mixtures thereof.

46. The softened mass of fibers of Claim 45, wherein the softening agent is applied in an amount ranging from 0.1% to 30.0% by weight based on the weight of the dry fibers and softening agent.

47. The softened mass of fibers of Claim 45, wherein the fibers are wood pulp fibers.

48. The softened mass of fibers of Claim 45, wherein the fibers include intrafiber crosslinks.

49. The softened mass of fibers of Claim 45, further comprising particles.

50. The softened mass of fibers of Claim 49, wherein the particles are superabsorbent.

51. A mass of fibers made by the method of Claims 39, 41, 42, 43, or 44.

52. An article comprising the fibers of Claims 45, 47, 48, or 50.
53. The article of Claim 52 selected from the group consisting of diapers, incontinent devices, bed pads, wipes, feminine hygiene products, and bandages.
54. The article of Claim 53, wherein the article is absorbent.

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